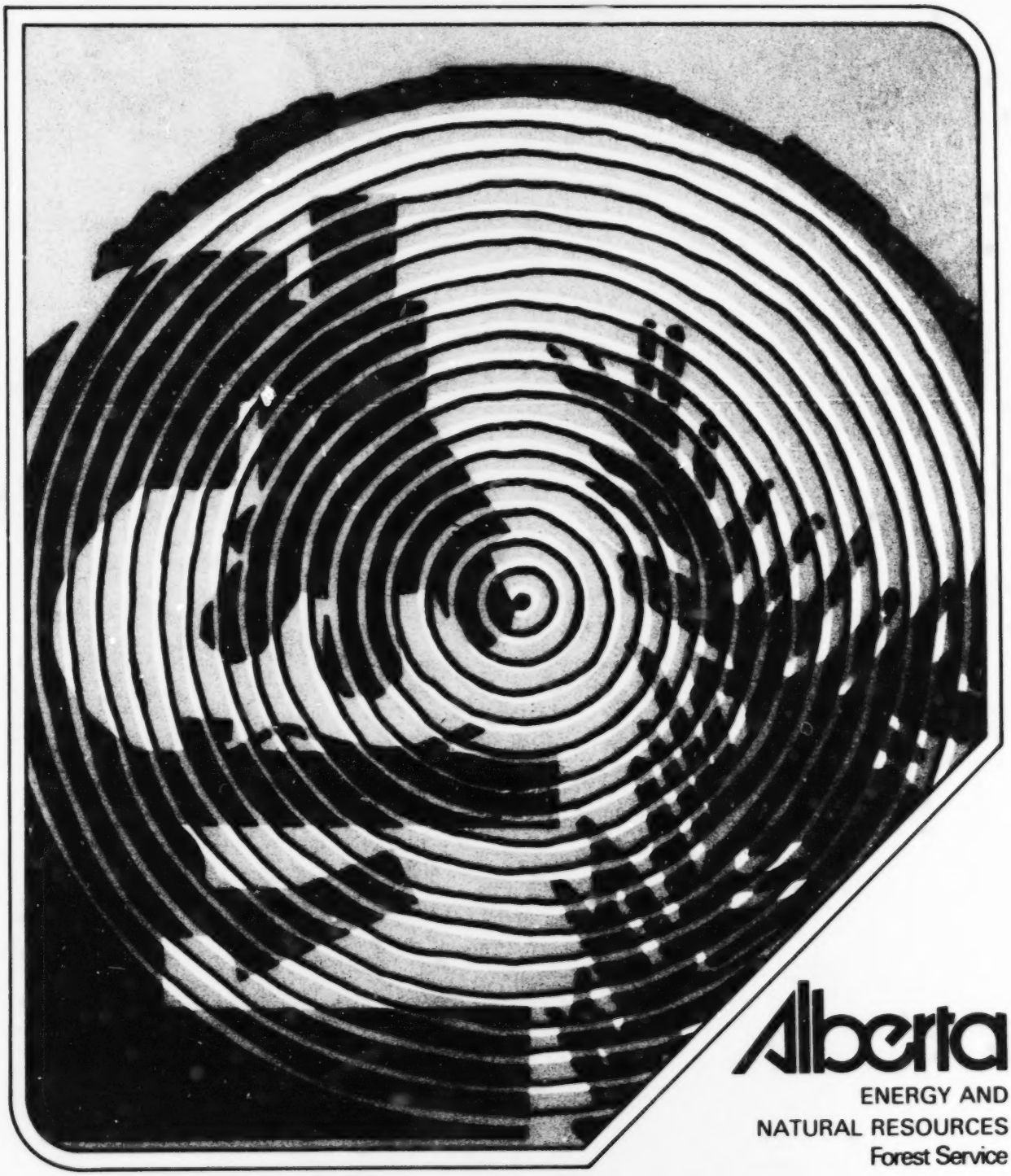
Forest Development Research Trust Fund

Annual Report 1982-83



Alberta

ENERGY AND
NATURAL RESOURCES
Forest Service

34.5

FOREST DEVELOPMENT
RESEARCH TRUST FUND

ANNUAL REPORT
1982-83

1983
Edmonton

Alberta
ENERGY AND
NATURAL RESOURCES
Forest Service

ENR Report Number: I/14 - 82/83
International Standard Book Number: 0-86499-116-9
International Standard Serial Number: 0713-1046

Additional copies of this report may be obtained from:

Alberta Energy and Natural Resources
Forest Research Branch
215 McLeod Avenue, Boville Building
Spruce Grove, Alberta
T0E 2C0
Phone: (403) 962-8700

Alberta
ENERGY AND
NATURAL RESOURCES
Forest Research Branch

215 McLeod Avenue, Postal Bag 6343, Spruce Grove, Alberta, Canada T0E 2C0 403/962-8700

The Hon. John Zaozirny
Minister of Energy and Natural Resources
319 Legislative Building
Edmonton, Alberta
T5K 2B7

Sir:

I have the honor to submit the Annual Report of the Forest Development Research Trust Fund for the fiscal year ending March 31, 1983.

Respectfully submitted,

J. Soos
Chairman of the Advisory Council
Forest Development Research
Trust Fund

FOREWORD

Five new and five renewed studies were financed by the Forest Development Research Trust Fund during the 1982/83 fiscal year. One study was completed and a final report submitted on sawmill size and chip production in Alberta. The results of this investigation are especially useful to both sawmill and pulp mill managers.

Wood-quality studies conducted in the Slave Lake area revealed that the fibre length and specific gravity of white spruce are excellent, regardless whether the trees are having a slow or fast growth rate.

Although research results appear to be promising for the development of antifungal substances produced by natural hyper-parasitic fungi for the control of western gall rust infestation, it will require considerable additional research before results can be applied in practice.

Three new studies were initiated in the fiscal year which may provide important information to forest practitioners. One study investigates whether white spruce seed can be exchanged between sites where considerable soil pH difference exists, without risking growth losses of future stands.

The other study will provide information on the severity of Armillaria root rot infestation in young coniferous stands. Results will show whether only weakened conifers can be attacked by this fungus or completely healthy ones can be destroyed under certain environmental conditions.

The results of a third study will become very helpful when drainage of forested peatlands is carried out on operational scale, requiring the quantification of water to be drained.

The members of the Forest Research Advisory Council deserve a great deal of credit for providing a critical review of research submissions and demonstrating keen interest for the sound management of the Forest Development Research Trust Fund.

TABLE OF CONTENTS

		Page
1.	FOREST RESEARCH ADVISORY COUNCIL.....	1
2.	COMPLETED PROJECTS.....	3
3.	NEW PROJECTS.....	7
4.	RENEWED PROJECTS.....	15
5.	FINANCIAL STATEMENT.....	21

FOREST RESEARCH ADVISORY COUNCIL

CHAIRMAN

J. Soos
Director
Forest Research Branch
Alberta Energy and Natural Resources
Spruce Grove, Alberta

MEMBERS

J.A. Brennan
Assistant Deputy Minister
Alberta Forest Service
Alberta Energy and Natural Resources
Edmonton, Alberta

C.A. Dermott
Director
Reforestation and Reclamation Branch
Alberta Energy and Natural Resources
Edmonton, Alberta

D.H. Fregren
Director
Timber Management Branch
Alberta Energy and Natural Resources
Edmonton, Alberta

A.D. Kiil
Director
Northern Forest Research Centre
Edmonton, Alberta

P.J. Murphy
Associate Dean
Faculty of Agriculture & Forestry
University of Alberta
Edmonton, Alberta

C.A. MacDonald
Staff Forestry Manager
Procter & Gamble Cellulose Ltd.
Grande Prairie, Alberta

A. Rytz
General Manager
Alberta Forest Products
Association
Edmonton, Alberta

Dr. H.P. Sims
Research Manager
Alberta Environment
Edmonton, Alberta

M.C. Summers
Woodlands Manager
Blue Ridge Lumber (1981) Ltd.
Whitecourt, Alberta

J.C. Wright
Chief Forester
St. Regis (Alberta) Ltd.
Hinton, Alberta

COMPLETED PROJECTS

SAWMILL SCALE AND RESIDUE UTILIZATION

INVESTIGATOR: Dr. W.E. Phillips, University of Alberta

NEW PROJECTS

DETERMINATION OF A CHEMICAL AND BIOLOGICAL ASSAY FOR BLUE-STAIN FUNGI

INVESTIGATORS:	Dr. W.A. Ayer, University of Alberta Dr. Y. Hiratsuka, University of Alberta
DURATION:	Two years
OBJECTIVES:	To develop a biological or phytochemical test which assays inhibition of water uptake caused by metabolites of some blue-stain fungi.
PROGRESS:	Two strains of Verticicladiella and Ceratocystis huntii fungi were used for the preparation of a liquid culture. The culture broth was decanted from the mycelium, extracted and subsequently dried. Lodgepole pine seedlings were inserted into a side-arm test tube containing test solutions. Three experiments were performed. One was designed to find out the choice of solvent, the other two contained solutions of metabolites. It was found that water uptake of seedlings decreased after four days in metabolite solutions; however, results were inconsistent.
FUTURE WORK:	Experimental design for the inoculation of seedlings will be modified, mainly to alleviate the problem of fluid loss through transpiration. In addition, further seed germination tests and root growth bioassay of jack pine will be carried out. Funding will be discontinued in future since the investigators have obtained a Natural Sciences and Engineering Research Council (NSERC) grant for this study.

PATHOLOGICAL AND PHYTOCHEMICAL STUDIES

OF ARMILLARIA ROOT ROT OF INTENSIVELY MANAGED YOUNG CONIFEROUS FORESTS

IN ALBERTA

INVESTIGATOR:	Dr. Y. Hiratsuka, University of Alberta Dr. W.A. Ayer, University of Alberta
DURATION:	Three years
OBJECTIVES:	To determine whether the weakening of the tree is necessary for disease expressions; to identify the possibility of a relationship between pathogen and disease distribution in several selected sites; to study the pathogenesis of the disease; and to identify biologically active metabolites produced by the pathogen.
PROGRESS:	A systematic literature survey was conducted on Armillaria root rot. Over 60 isolates of Armillaria mellea were obtained from the United Kingdom (U.K.), and several locations in Alberta. Preliminary investigations were initiated to compare various biological forms of this fungus obtained from various locations in Canada and the U.K. Search for a consistent and reliable inoculation method was conducted and successfully carried out by using sterilized carrot sticks and wood blocks. A "trap log" plot was established in the Hinton area to study the distribution of the organism and incidence of disease. Metabolites of several forms of Armillaria were extracted and some of them identified.
FUTURE WORK:	Research on all areas described in the progress section will be continued.

CORRELATION OF GLOBAL AND NET RADIATION WITH EVAPOTRANSPIRATION ON A FORESTED WETLAND SITE, NORTHERN ALBERTA

INVESTIGATOR:	Dr. R.L. Rothwell, University of Alberta
DURATION:	Three years
OBJECTIVES:	To establish a set of empirical relationships between total global shortwave radiation and water table fluctuations and net radiation and evapotranspiration for a forested wetland site. To use these relationships and attendant data as a basis for evaluation of existing methods for estimating evaporation from wetlands and/or develop a local method based on readily available climatic data.
PROGRESS:	A study site was selected adjacent to a peat drainage study near Saulteaux River 36 km south-east of Slave Lake Town. Some instrumentation of the study site was accomplished by installing a recording precipitation gauge and erecting a meteorological tower. Other instruments and scientific equipments required for the study were ordered. A literature survey was carried out pertaining to radiation studies in peatland and the development of an automatic recording system for a class A evaporation pan.
FUTURE WORK:	Installation of a shallow groundwater well, recording evaporation pan, radiation and other climatological instruments will be carried out. A series of five-six day sampling periods of net radiation during the growing season will be conducted. Sampling and description of hydrologic properties of the peat deposit near the observation site will be completed.

FIELD AND GREENHOUSE PERFORMANCE

OF WHITE SPRUCE EDAPHIC ECOTYPES

INVESTIGATORS:	Dr. D.J. Pluth, University of Alberta Dr. B.P. Dancik, University of Alberta
DURATION:	Four years
OBJECTIVES:	To determine greenhouse survival and growth of white seedling populations collected from areas having differing calcium concentrations.
PROGRESS:	A detailed project proposal was developed based on a literature survey and consultation with other researchers. Site selection and cone collections were carried out and seed was extracted. Bulk samples of soils were collected for the greenhouse experiments. Trials for an appropriate ratio of soil and perlite mixture to standardize bulk density of growing media were conducted.
FUTURE WORK:	To carry out greenhouse research with white spruce seedling populations collected from three geographic areas based on methods outlined in detailed project proposal.

FLORA OF ALBERTA

INVESTIGATOR:	Dr. J.G. Packer, University of Alberta
DURATION:	One year
OBJECTIVES:	To complete an up-to-date second edition of Flora of Alberta that fully represents current knowledge of the flora and which is at least the equal of any recently published regional flora.
PROGRESS:	The galley proofs have been corrected and returned to the publishers. The page proofs are expected shortly.
FUTURE WORK:	A published book by the fall of 1983, representing the completion of this study. The book was published during 1983 fall by the University of Toronto Press.

RENEWED PROJECTS

ECONOMIC CONSEQUENCES OF FOREST LAND LOSSES TO NON-TIMBER USES IN ALBERTA WITH PARTICULAR REFERENCE TO AGRICULTURE

INVESTIGATOR:	Dr. W.E. Phillips, University of Alberta
DURATION:	Three years
OBJECTIVES:	To identify and describe recent forest land-use changes from timber and related uses to other land uses with particular emphasis on agriculture. Economic analytical techniques and procedures used in assessing land-use changes will be examined and modified. Alternative forest land uses will be examined in an economic framework including consequences.
PROGRESS:	A number of background tasks was completed including an historical description of public land uses in Alberta and recent trends in the use of Alberta public lands for timber production. Similar information was obtained for recreation as well, including an identification of past and potential land-use conflicts. The methodology of this study was also refined. Particular emphasis was given to the critical review and evaluation of economic productivity measures applicable to forestry and agricultural land resource uses.
FUTURE WORK:	Empirical application of economic productivity will be carried out, including selection of an area for case studies for both forestry and recreation. The forestry-coal land-use analysis will commence during the summer of 1983.

VARIATION OF ANATOMICAL AND PHYSICAL PROPERTIES OF WHITE SPRUCE AND LODGEPOLE PINE GROWN IN ALBERTA

INVESTIGATOR:	Dr. M.M. Micko, University of Alberta
DURATION:	Three years
OBJECTIVES:	To characterize the natural variation of wood properties, particularly specific gravity and tracheid length of white spruce and lodgepole pine growing in Alberta, and establish base line values.
PROGRESS:	Four white spruce stands and 10 trees from each stand were selected in the vicinity of Slave Lake for specific gravity and fibre length determinations. Specific gravity of white spruce was somewhat greater here than in the forests of Edson and High Level. Specific gravity is generally independent of growth rate. There is no well-defined specific gravity pattern along the bole of trees. Tracheid length increases with age, and increases within the same annual ring from the bottom of the tree to the top.
FUTURE WORK:	This project is completed with a submission of a report pertaining to the wood quality of white spruce in the Slave Lake region.

ISOLATION AND CHARACTERIZATION OF ANTIFUNGAL SUBSTANCE(S) PRODUCED BY *SCYTALIDIUM UREDINICOLA*, A HYPERPARASITE OF *ENDOCRONARTIUM HARKNESSII*, WESTERN GALL RUST

INVESTIGATOR:	Dr. M.A. Pickard, University of Alberta
DURATION:	One year
OBJECTIVES:	To demonstrate the ability of compound(s) produced by *S. uredinicola* to inhibit the germination of *E. harknessii* spores *in vitro*, and to isolate and purify the active compounds. The effectiveness of the compounds will be tested *in vivo* against western gall rust on lodgepole and jack pine as a means of biological control.
PROGRESS:	Based on previous observations it was confirmed that *Endocronartium harknessii* spores, stored and desiccated at -20°C for six weeks, germinated within six hours at room temperature. *Scytalidium album* produced a fraction which caused spore lysis. Two strains of *S. uredinicola* only inhibited germination of *E. harknessii* spores. Preliminary studies were carried out on the isolation and purification of active compounds. *S. album* batches were grown in a two percent malt extract medium and a compound with high molecular weight was obtained by ultrafiltration. The active macromolecule appeared to be protein. Determination whether this protein has enzymic characteristics was unsuccessful. Purification of *S. uredinicola* strains did not reveal any new compounds; the antifungal agent of scytalidin was not found.
FUTURE WORK:	Development of separate methodologies for the isolation of both sporolytic and sporostatic compounds is necessary. It is planned that the size of present growth medium fermenter is to be increased to 10 L capacity.

VARIATION OF ANATOMICAL AND PHYSICAL PROPERTIES OF ASPEN IN ALBERTA

INVESTIGATOR:	Dr. M.M. Micko, University of Alberta
DURATION:	Five years
OBJECTIVES:	To establish basic information about the variation of wood specific gravity and fibre length, growth rate and decay in naturally occurring aspen clones in Alberta.
PROGRESS:	Wood samples were collected from 11 individual aspen clones near Slave Lake for the determination of wood density and fibre length. The number of trees selected from each clone for wood density and fibre length determination varied between six to 10 trees per clone. Mean wood density for the Slave Lake area was 0.349 as compared with 0.368 for the Whitecourt area. Highly significant differences between clones were found for both fibre length and wood density values. The clones sampled in the Slave Lake area had longer average fibre length than clones in the Whitecourt area. A computerized fibre-length measuring technique was developed which considerably reduces the time required for determining fibre length.
FUTURE WORK:	Development of a comprehensive five-year program and execution of a subsequent research program are planned.

FOREST DEVELOPMENT RESEARCH TRUST FUND

FINANCIAL STATEMENTS

MARCH 31, 1983

Auditor's Report

Balance Sheet

Statement of Revenue, Expenditure and Unexpended Funds

Notes to the Financial Statements

ALBERTA LEGISLATURE

OFFICE OF THE AUDITOR GENERAL

AUDITOR'S REPORT

To the Council of the Forest Development
Research Trust Fund

I have examined the balance sheet of the Forest Development Research Trust Fund as at March 31, 1983 and the statement of revenue, expenditure and unexpended funds for the year then ended. My examination was made in accordance with generally accepted auditing standards, and accordingly included such tests and other procedures as I considered necessary in the circumstances.

In my opinion, these financial statements present fairly the financial position of the Fund as at March 31, 1983 and the results of its operations for the year then ended in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

C.A.
Auditor General

Edmonton, Alberta
September 1, 1983

Statement A

FOREST DEVELOPMENT RESEARCH TRUST FUND

BALANCE SHEET

AS AT MARCH 31, 1983

	1983	1982
ASSETS		
Current:		
Deposits in trust (Note 3)	$284,519	$297,950
LIABILITIES		
Current:		
Research grants payable	$ 72,147	$ 53,994
Accounts payable	-	460
Due to the Province of Alberta (Note 4)	-	18,976
Unexpended funds, Statement B	212,372	224,520
	$284,519	$297,950

The accompanying notes are part of these financial statements.

FOREST DEVELOPMENT RESEARCH TRUST FUND

STATEMENT OF REVENUE, EXPENDITURE AND UNEXPENDED FUNDS

FOR THE YEAR ENDED MARCH 31, 1983

	1983	1982
REVENUE		
Contributions by the Province of Alberta (Note 4)	$100,000	$150,000
Interest	41,137	49,764
Donations	115	115
	141,252	199,879
EXPENDITURE		
Research grants	152,825	130,564
Council members' fees and expenses	575	460
	153,400	131,024
Excess of revenue over expenditure	(12,148)	68,855
Less: Due to the Province of Alberta (Note 4)	-	18,976
	(12,148)	49,879
Unexpended funds at beginning of year	224,520	174,641
Unexpended funds at end of year	$212,372	$224,520

FOREST DEVELOPMENT RESEARCH TRUST FUND

NOTES TO THE FINANCIAL STATEMENTS

MARCH 31, 1983

Note 1 Authority

The Forest Development Research Trust Fund operates under the authority of the Forest Development Research Trust Fund Act, Chapter F-13, Revised Statutes of Alberta 1980.

Note 2 Significant Accounting Policies and Reporting Practices

Administration Expenses

Salaries, accommodation, and other overhead costs incurred in the administration of the Fund have been paid by the Province of Alberta and are not reflected in these financial statements.

Changes in Financial Position

A statement of changes in financial position is not provided as disclosure in these financial statements is considered to be adequate.

Note 3 Deposits in Trust

Deposits in trust consist of deposits in the Consolidated Cash Investment Trust Fund of the Province of Alberta.

Note 4 Due to the Province of Alberta

The Department of Energy and Natural Resources provides contributions annually for research and council members' expenditure incurred by the Fund. Where expenditure is less than the contributions in any given year, the balance is repayable to the General Revenue Fund of the Province.

	1983	1982
Contributions by the Province of Alberta	$100,000	$150,000
Expenditure	153,400	131,024
Due to the Province of Alberta	$ -	$ 18,976

Note 5 Commitments

As at March 31, 1983, the Fund had research grant commitments totalling $181,830 (1982 $137,548).

Note 6 Approval of Financial Statements

These financial statements were approved by management on September 1, 1983.

POOR

QUALITY

ORIGINAL